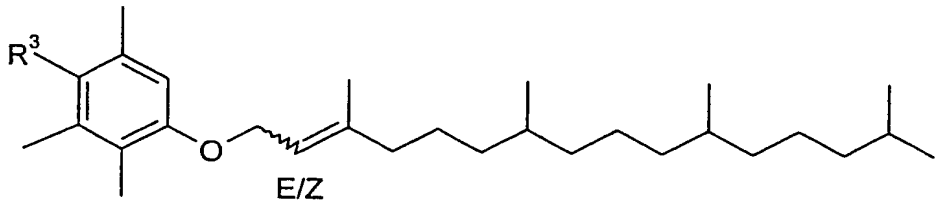
Claims

1. A process for the manufacture of compounds represented by the following formula III

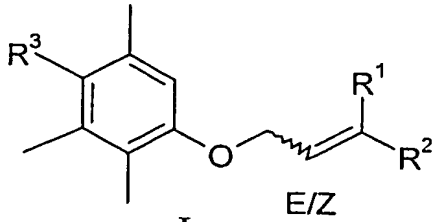


III

wherein R^3 is C_{2-5}-alkanoyloxy,

by the reaction of

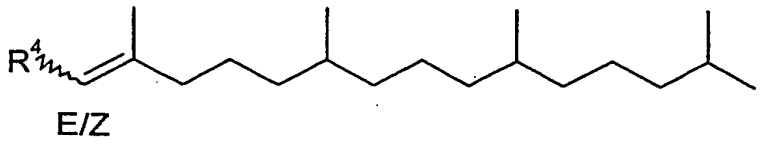
a) a compound represented by the following formula I



I

wherein R^1 and R^2 are independently from each other H or C_{1-5}-alkyl, with the proviso that at least one of R^1 and R^2 is not H, and
wherein R^3 is as defined above, with

b) a compound represented by the following formula II



II

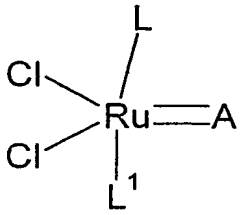
wherein R^4 is H or CH_2-R^5,
wherein R^5 is formyloxy, C_{2-5}-alkanoyloxy, benzoyloxy, C_{1-5}-alkoxy or $OSiR^6R^7R^8$,
wherein R^6, R^7 and R^8 are independently from each other C_{1-6}-alkyl or phenyl,

in the presence of a cross-metathesis catalyst.

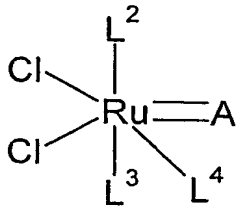
2. The process as claimed in claim 1, wherein the cross-metathesis catalyst is a ruthenium compound used in homogeneous catalysis.

3. The process as claimed in claim 2, wherein the ruthenium compound is a ruthenium metal carbene complex possessing (a) ruthenium metal center(s), having an electron count of 16 and being penta-coordinated or a ruthenium metal carbene complex possessing (a) ruthenium metal center(s), having an electron count of 18 and being hexa-coordinated, preferably a ruthenium metal carbene complex possessing a ruthenium metal center, having an electron count of 16 and being penta-coordinated.

4. The process as claimed in claim 2, wherein the ruthenium compound is one of the complexes represented by the following formulae VIIa, VIIb and VIIc:

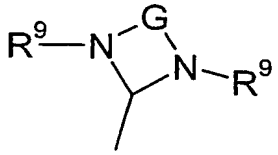


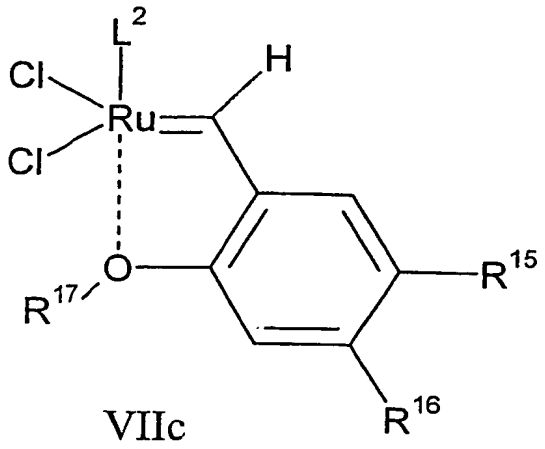
VIIa



VIIb

L =





VIIc

wherein R^9 is an optionally single or multiple C_{1-5}-alkylated and/or C_{1-5}-alkoxylated phenyl,

G is ethane-1,2-diyl, ethylene-1,2-diyl, cyclohexane-1,2-diyl or 1,2-diphenylethane-1,2-diyl,

L^1 is $PR^{10}R^{11}R^{12}$,
wherein R^{10}, R^{11} and R^{12} are independently from each other C_{1-8}-alkyl, phenyl or tolyl,

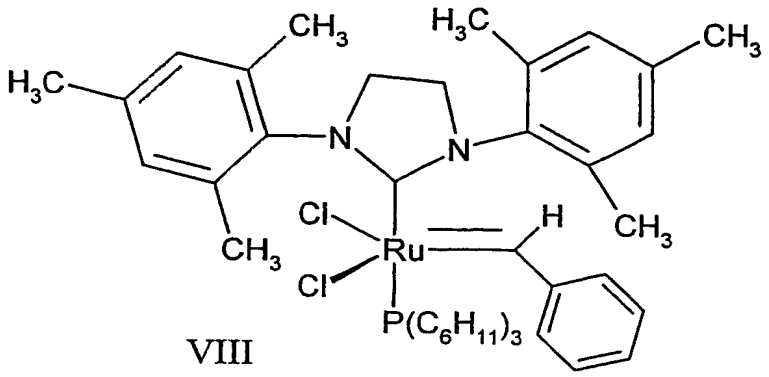
A is CH_2, C(H)aryl, $C(H)R^{13}$, $C=C(R^{13})_2$, $C=C(H)Si(R^{14})_3$, $C(H)–C(H)=C(R^{13})_2$, C=C(H)(phenyl), C(H)–C(H)=C(phenyl)$_2$ or C=C=C(phenyl)$_2$,
wherein "aryl" is an optionally single or multiple C_{1-5}-alkylated and/or halogenated phenyl, R^{13} is C_{1-4}-alkyl, R^{14} is C_{1-6}-alkyl or phenyl,

L^2 is L or L^1,

L^3 and L^4 are independently from each other pyridyl or 3-halopyridyl, wherein halo is Br or Cl,

R^{15} and R^{16} are both H or form together a fused benzene ring, and R^{17} is C_{1-5}-alkoxy.

5. The process as claimed in claim 2, wherein the ruthenium compound is represented by the following formula VIII



VIII

6. The process as claimed in any of the proceeding claims, wherein the reaction is carried out in an aprotic organic solvent.

7. The process as claimed in claim 6, wherein the aprotic organic solvent is a dialkyl ether R^{18}–O–R^{19}, tetrahydrofuran, tetrahydropyran, 1,4-dioxane, methylene chloride, chloroform, cumene, an optionally once, twice or thrice methylated arylene, or a mixture thereof,

wherein R^{18} and R^{19} are independently from each other linear C_{1-4}-alkyl or branched C_{3-8}-alkyl.

8. The process as claimed in claim 7, wherein the aprotic organic solvent is tetrahydrofuran, methylene chloride, chloroform, toluene or a mixture thereof, preferably toluene.

9. The process as claimed in claims 6 to 8, wherein from about 3 ml to about 15 ml, preferably from about 4 ml to about 10 ml, more preferably from about 4.5 ml to about 8 ml of the aprotic organic solvent are used per mmol of compound a) or b), whichever is used in the lesser amount.

10. The process as claimed in claims 1 to 5, wherein the reaction is carried out essentially in the absence of an additional solvent.

11. The process as claimed in claim 10, wherein the reaction is carried out in vacuo, preferably at a pressure below 100 mbar.

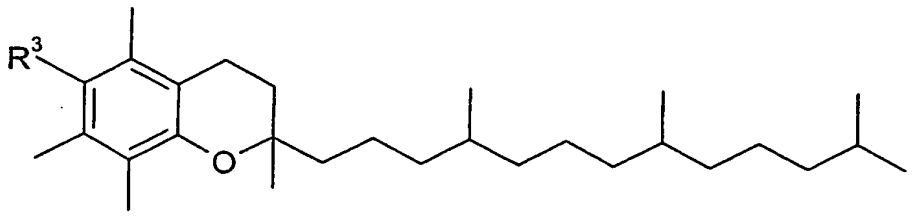
12. The process as claimed in any one of the proceeding claims, wherein the relative amount of the cross-metathesis catalyst to the amount of compound a) or b), which-

ever is used in the lesser amount, is from about 0.0001 mol% to about 20 mol%, preferably from about 1.0 mol% to about 10 mol%, more preferably from about 2 to about 5 mol%.

13. The process according to any one of the proceeding claims, wherein the molar ratio of compound a) to compound b) present in the reaction mixture is from about 1 : 10 to about 10 : 1, preferably from about 1 : 5 to about 5 : 1, more preferably from about 1 : 3 to about 1 : 2.5.

14. The process as claimed in any one of the proceeding claims wherein the reaction is carried out at temperatures from about 10°C to about 120°C, preferably from about 30°C to about 100°C, especially from about 40°C to about 85°C.

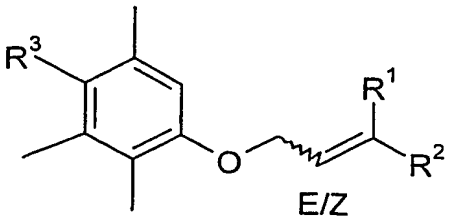
15. A process for the manufacture of α-tocopheryl alkanoates represented by the following formula V



V

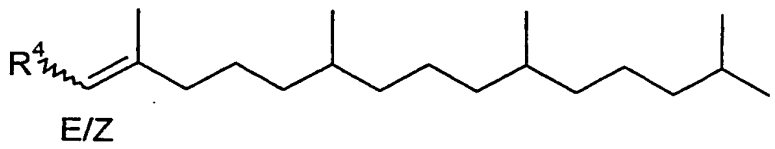
comprising the following steps:

i) reacting of a compound represented by the following formula I



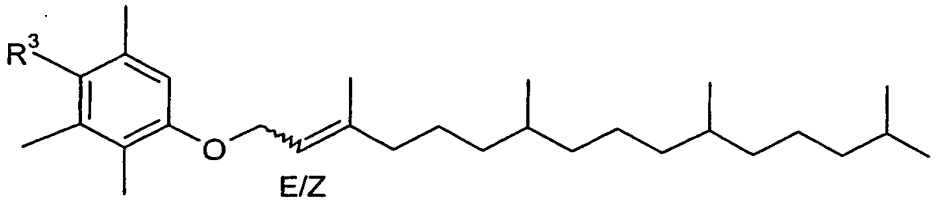
I

with a compound represented by the following formula II



II

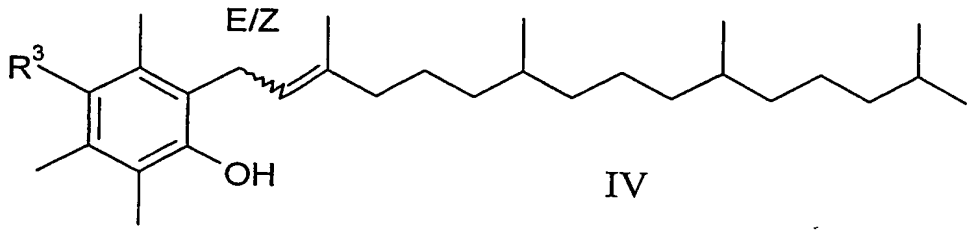
to a compound represented by the following formula III



III

in the presence of a cross-metathesis catalyst,

ii) subjecting the compound represented by the formula III and obtained in step i) to a rearrangement to the compound represented by the following formula IV, and

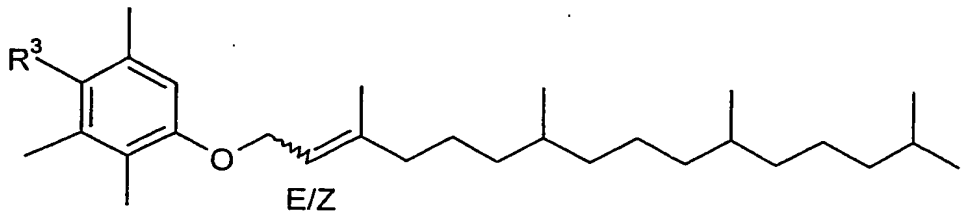


IV

iii) subjecting the compound represented by the formula IV and obtained in step ii) to a cyclization to the compound represented by the formula V,

wherein R^1, R^2, R^3 and R^4 are as defined in claim 1.

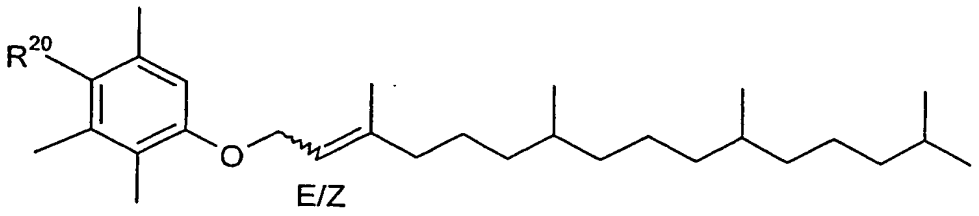
16. Compounds of the formula III



III

wherein R^3 is C_{2-5}-alkanoyloxy.

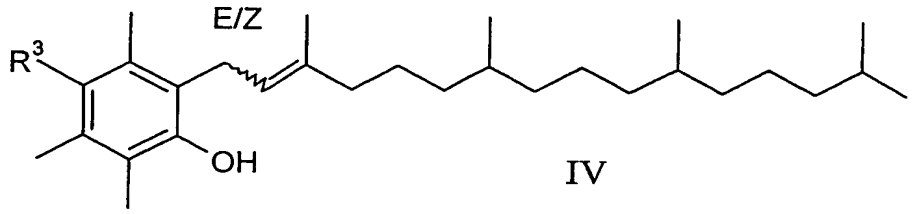
17. Compounds of the formula IX



IX

wherein R^{20} is C_{3-5}-alkanoyloxy.

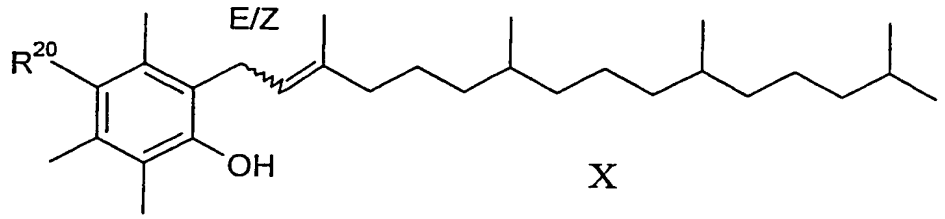
18. Compounds of the formula IV



IV

wherein R^3 is C_{2-5}-alkanoyloxy.

19. Compounds of the formula X



X

wherein R^{20} is C_{3-5}-alkanoyloxy.